

[54] NANOMETRIC DRIVE APPARATUS

[75] Inventor: Jon Myer, Woodland Hills, Calif.

[73] Assignee: Hughes Aircraft Company, Los Angeles, Calif.

[21] Appl. No.: 37,495

[22] Filed: Apr. 13, 1987

[51] Int. Cl.⁴ G01B 3/18

[52] U.S. Cl. 33/164 B; 33/166

[58] Field of Search 33/164 R, 164 B, 166

[56] References Cited

U.S. PATENT DOCUMENTS

1,133,652	3/1915	May	33/164 B X
3,002,284	10/1961	Sunnen	33/164 R X
3,020,775	2/1962	Musser	
3,088,333	5/1963	Musser	
4,139,948	2/1979	Tsuchiya et al.	
4,209,233	6/1980	Eisler	
4,331,384	5/1982	Eisler	

Primary Examiner—Harry N. Haroian

Attorney, Agent, or Firm—V. D. Duraiswamy; A. W. Karambelas

[57] ABSTRACT

A nanometric drive apparatus providing superimposed coarse and fine adjustment for producing axially-directed linear displacement of a single linear displacement element. Linear displacement in the nanometric range is achieved. In the preferred embodiment an elongated shaft having finely pitched threads is controlled by a co-axially integrated coarse control knob. Superimposed and surrounding the coarsely controlled shaft is a nanometric drive assembly which includes a harmonic wave generator for differentially translating small rotational movement between concentric members of the drive assembly to the elongated shaft. The harmonic wave generator is coupled to the elongated shaft through a shaft engagement bearing friction sleeve which continually engages a reentrant sleeve urging the shaft forward in an axially linear direction for movement as small as the nanometric range, or as little as 8.6 millionths of an inch.

13 Claims, 3 Drawing Sheets

